



Water for the World

Resource Package for Teachers

Two or more EWB member representatives will soon be making a visit to your classroom to make a presentation on global water issues. These presentations are taking place in high schools all across Canada!

This package provides some background information for teachers to let you know what to expect. This package includes:

- Details on the target audience and the presentation format
- Handouts for you to distribute as in-class work or homework prior to the EWB presentation
- Information on an essay contest that you can use as a follow-up activity with your class.

Target Audience

The presentation is best suited for Science and Geography classes between grades 9 and 12. High school environmental and social justice clubs will also find the presentation very relevant. Because the presentation is quite interactive, it is limited to a group size between 10 and 35 students.

Presentation Format

Two or more EWB member representatives from your local university chapter will visit your classroom and give a 60- to 90- minute presentation, depending on the timing of your class. Using a PowerPoint presentation as visual aids, the EWB members will discuss local and global water issues, and what youth can do about these issues. Please arrange with the EWB members which type of audio-visual equipment will be available for the presentation.

Audio-visual equipment required: Overhead projector and screen **or**
Laptop, LCD projector and screen.

A large part of the presentation (about 30 minutes) is a hands-on activity where groups of 4-6 students make their own water filters out of recycled plastic bottles and multiple layers of sand and gravel. The students are grouped into different countries, and are provided with different levels of information and amounts of play money, depending on their country's literacy rate and wealth. Through this activity, students are challenged to think critically and creatively, while collaborating with their peers.

Warning: Students may get their clothes dirty during the activity

The teacher is expected to remain in the classroom during the presentation to assist with the supervision of the activity and to maintain a level of discipline in the class.

Learning Benefits

The students will gain a better understanding of social issues in technological development, international interdependency and cooperation, of drinkable water global needs, in resources availability and scarcity, as well as the role the youth has to address in those issues.

Handouts

Two separate student handouts – one for Science classes and one for Geography classes – are provided in this package. These can be assigned as in-class work or homework the day before the EWB presentation.

Assigning these handouts will help prepare the students for the topic to be covered, and as a result, facilitate more active learning during the presentation.

EWB High School Essay Contest

To encourage high school students to become further engaged with the issues presented in the Water for the World presentation, Engineers Without Borders is hosting an essay contest.

High school students are asked to write a 500-word essay on the topic: “What kind of world do you want to live in, and what will it take to get there?”. Please note that the essay can be submitted either in English or French.

The grand prize is a \$500 scholarship and a free trip to attend the EWB National Conference. The student whose winning essay is received before December 31st, 2006 will be invited to attend the 2007 conference held in January in Calgary.

For more information on the essay contest, please refer to the enclosed poster or contact Kimberly Bowman at kimberly@ewb.ca.

Acknowledgements

This document and the Water for the World presentation have been produced with the support of the Government of Canada through the Canadian International Development Agency (CIDA).



Student Worksheet

Science

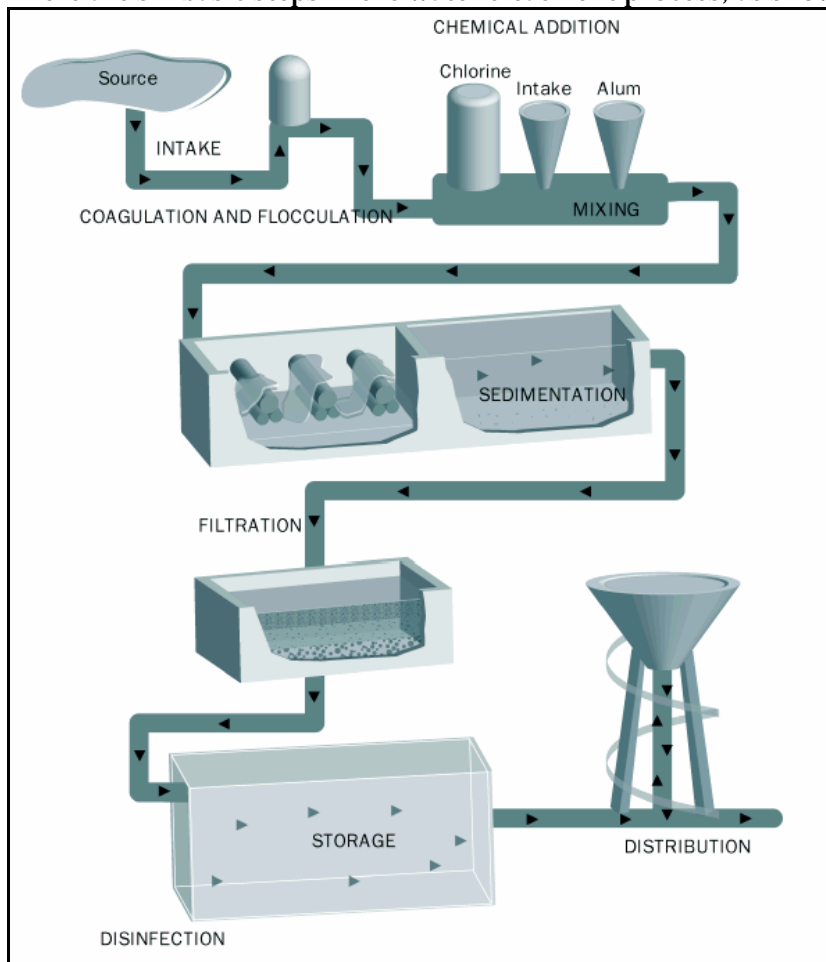
Where does your water come from?

Depending on where you live in Canada, your tap water comes from either groundwater or surface water supplies. Groundwater is water that is found in soil or in cracks in underground rock. It is called groundwater because this water is in the ground, below the surface of the Earth. Surface water is water that is at the surface of the Earth. Surface water includes lakes, streams, rivers and ponds.

What do you know about water treatment?

Water treatment is the process of cleaning water. Treatment makes the water safe for people to drink.

There are six basic steps in the water treatment process, as shown in Figure 1.



Draw lines connecting each step in Figure 1 to the corresponding number, below:

1. Intake
2. Chemical addition
3. Coagulation and flocculation
4. Sedimentation
5. Filtration
6. Post-treatment disinfection

Figure 1: Steps of the Water Treatment Process

Read the explanations of the water treatment process and answer the questions that follow.

1. Intake: Water is taken from the source through a large pipe and drawn into the treatment plant. A screen at the end of the pipe prevents logs, fish, and plants from being drawn in. If the source is groundwater, the soil and rocks do the “screening” naturally as the water travels under the Earth’s surface. Depending on the quality, groundwater may not require further treatment.

2. Chemical addition: Chemicals such as chlorine and aluminum sulphate (alum) are added and mixed into the water. These chemicals kill bacteria in the water, improve its taste and odour, and cause any tiny particles in the water to clump together and settle.

3. Coagulation and flocculation. The chemicals that were added to the water cling to any substances floating in the water. The process of things sticking together like this is called coagulation. Then the particles begin to stick to each other and form larger particles. These larger particles are called floc.

4. Sedimentation: The water and the floc flow into a sedimentation basin. The water sits here for a time to allow the floc to settle to the bottom. In addition to removing particles from the water, this process also removes bacteria, which typically attach themselves to the particles.

5. Filtration: The water flows out of the sedimentation basin and into the filtration area. The water is filtered through layers of sand and gravel to remove any remaining particles.

6. Post-treatment disinfection: The water flows from the filtration area on its way to the storage area and the distribution system. Along the way, a small amount of chlorine is added as a disinfectant. This is used to kill any remaining germs and to keep the water safe as it travels to the public.

(a) Does your city’s drinking water come from a surface water or groundwater source?

(b) What is the name of your city’s drinking water source?

(c) Define the term “pathogenic bacteria.”

(d) Give one example of pathogenic bacteria that can be found in water.

(e) What is chlorine used for in the water treatment process?

Case Study 1

Walkerton report highlights

CBC News Online | January 2002

The most serious case of water contamination in Canadian history could have been prevented by proper chlorination of drinking water, according to a judicial inquiry report about Walkerton, Ontario's fatal E. coli outbreak.

Seven people died and 2,300 became ill after Walkerton's water supply became contaminated with manure spread on a farm near the town, the report concludes.

Read the article on the left and answer the following questions:

1. What type of microbiological contamination occurred in Walkerton?

2. What was the source of the contamination?

3. What water treatment process could have prevented the outbreak?

Case Study 2

Read the article on the right and answer the following questions:

1. What type of microbiological contamination occurred in North Battleford?

2. What was the source of the contamination?

3. Which groups of people were at greatest risk of getting sick?

4. Why were people told to boil their water?

Water scare strikes North Battleford, Saskatchewan

CBC News Online | March 2001

NORTH BATTLEFORD, SASK. - People living in a central Saskatchewan community are angry and shocked to learn that three people might have died from drinking the water.

Officials in North Battleford are investigating three deaths to see if they are connected to the parasite cryptosporidium, which was recently found in the water supply.

"This is definitely the day North Battleford was not looking forward to," said Mayor Wayne Ray after the announcement.

People are also being told to boil their water, even though the parasite is not a great danger to healthy people, causing diarrhea-like symptoms.

For people with weakened immune systems, however, it is much more serious.

So far 20 people have been made ill by the parasite.

City officials say the North Battleford contamination was likely caused by a problem with the town's water filtration system.

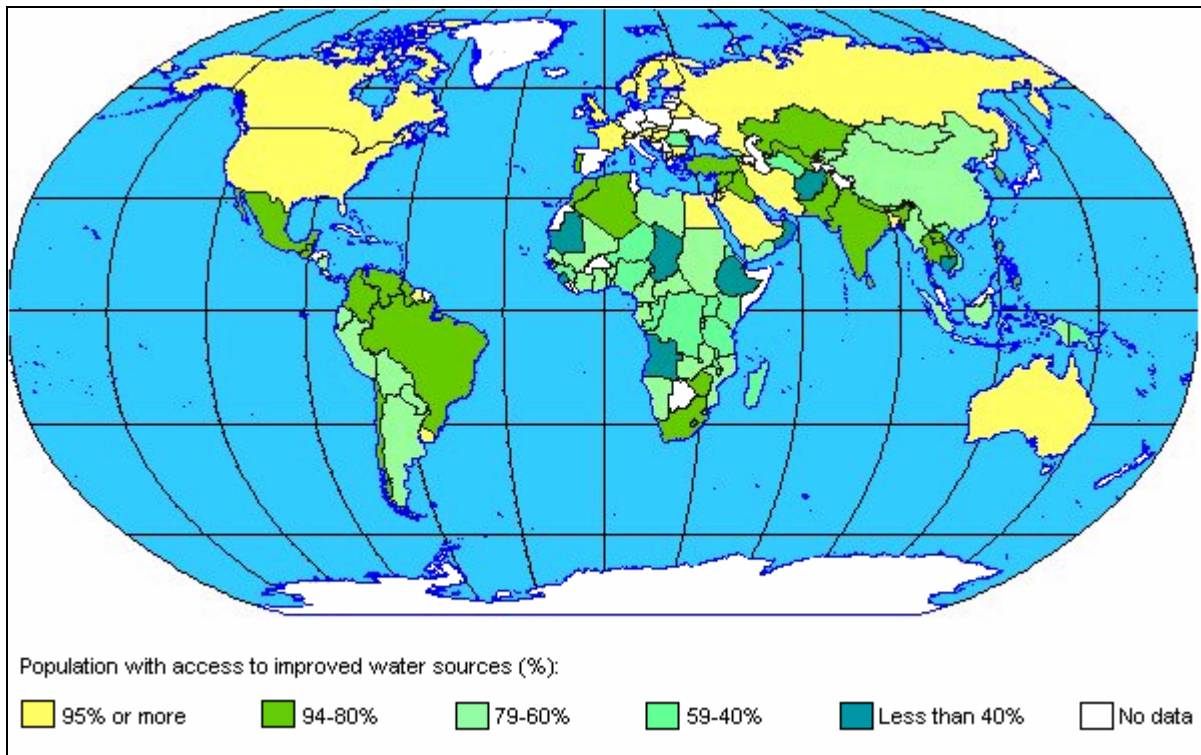


Student Worksheet

Geography

The map below shows the percentage of each country's population that has access to clean water. As shown in the map, over 95% of Canadians have access to clean water. However, there are many countries, particularly in Africa and Asia, where clean water is accessible to below 59% of their population.

In fact, one in every 6 people worldwide, or 1.1 billion people, has no access to clean drinking water. Dirty water is the cause of numerous diseases. About 2.2 million deaths each year are due to diarrhoeal diseases that can be attributed to poor water, sanitation and hygiene.



Questions

1. Which continent has the greatest access to improved water sources?

2. Which continent has the lowest access to improved water sources?

Case Study

Elmas Kassa is 13-years-old and lives in a slum area of Addis Ababa in Ethiopia. Her father is a labourer and her mother is a washerwoman. She has one younger sister and a brother.

'I go to collect water four times a day, in a 20-litre clay jar. It's hard work! When I first started collecting water I was about seven-years-old. In those days we used to have to walk over a mile to fetch water. Now there is a tapstand about 10 minutes from my home, which has made life easier.

I've never been to school as I have to help my mother with her washing work so we can earn enough money. I also have to help with the cooking, go to the market to buy food and collect twigs and rubbish for the cooking fire.

Our house doesn't have a bathroom. I wash myself in the kitchen once a week, on Sunday. At the same time I change my clothes and wash the dirty ones. When I need the toilet I have to go down to the river in the gully behind my house. I usually go with my friends as we're only supposed to go after dark when people can't see us. In the daytime I use a tin inside the house and empty it out later.

If I could alter my life, I would really like to go to school.'



Elmas Kassa

Questions

1. Find Ethiopia on the map on page 1. What percentage range of Ethiopia's population has access to an improved water source?

2. According to the case study, does Elmas' family have access to an improved water source? If so, how has the water source improved?

3. How much total time does it take Elmas to collect water each day?

4. When Elmas was younger, approximately how much total time did it take Elmas to collect water each day? (Hint: 1 mile = 1.6 km)
